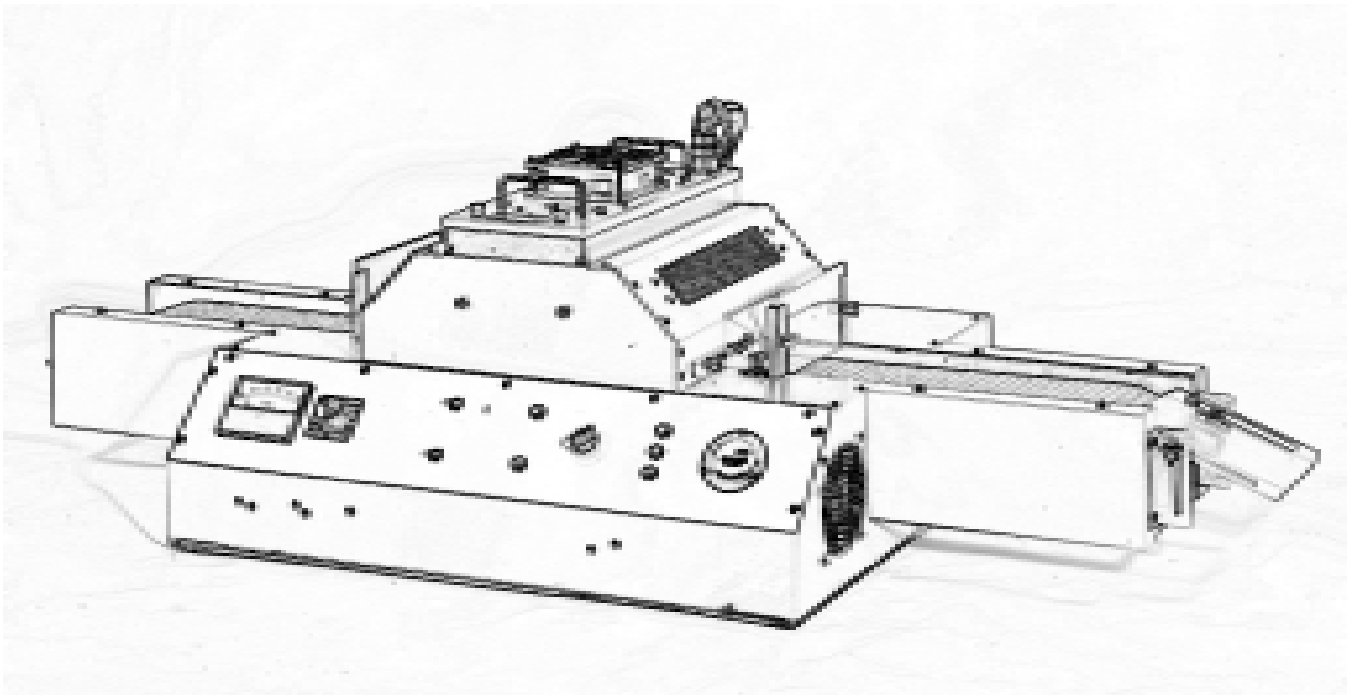
Benchtop UV Curing System

Installation and User Manual



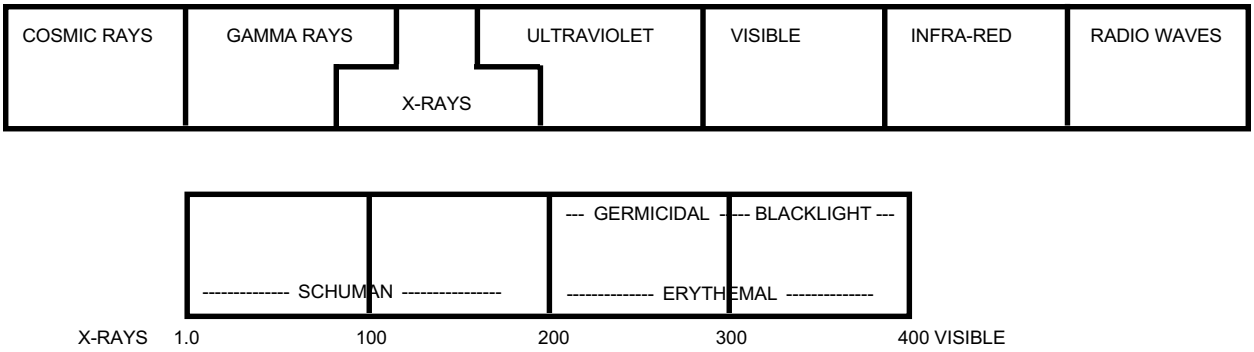
CAUTION: ULTRAVIOLET LAMPS EMIT RADIATION THAT IS HARMFUL TO EYES AND SKIN. GREAT CARE SHOULD BE TAKEN TO INSURE THAT PERSONNEL ARE NOT EXPOSED TO DIRECT OR REFLECTED RADIATION. SUITABLE EYE PROTECTION, SUCH AS UVP, INC. UV BLOCKING SPECTACLES OR GOGGLES, SHOULD BE WORN WHEN LAMP IS IN OPERATION. BEFORE CLEANING OR RELAMPING, ALWAYS TURN THE POWER OFF.

UVP®

81-0180-01 Rev A

ULTRAVIOLET RADIATION

The band of radiation just below the violet end of the visible spectrum is called ultraviolet. This invisible band is divided into several regions.



Various bands exist with the lower band overlapping into the X-ray band. “Near” ultraviolet, between 320nm and 440nm, is also known as “blacklight” or longwave ultraviolet. “Middle” ultraviolet, between 280nm and 320nm, is called “erythemal” or sun tan ultraviolet. “Far” ultraviolet, between 300nm and 400nm, is known as “germicidal” ultraviolet.

Industrial UV curing ultraviolet extends lower to 180nm and higher to 420nm.

Ultraviolet is produced artificially by various sources: UV curing lamps, blacklight lamps, sun tan lamps, germicidal lamps, carbon arcs, welding and cutting torches, furnaces, laboratory test and analysis equipment. Nature, in the form of the sun is a major natural source.

“UV Curing” is a process involving polymerization, or crosslinking of monomers upon exposure to UV radiation.

Applications comprise curing of printing inks, curing coatings for wood and paper, particleboard fillers, metal coatings, adhesives, and prepegs.

All monomers do not polymerize when exposed to UV radiation. UV curable monomers usually include a sensitizer, which absorbs UV energy initiating polymerization reaction in the monomer.

ADVANTAGES OF UV CURING

UV curable materials are 100% solids, with no solvents to be discharged into the atmosphere. As they polymerize entirely, a noted reduction in air pollution results.

Plant space is saved, as the UV curing line is considerably shorter than a gas oven. Time is saved as material reacts immediately to UV exposure negating the time lag necessary to raise coating temperature to induce thermal curing.

Lower number of processing and handling procedures provide labor savings. Printed matter is ready for cutting and folding after UV processing. Wood and particleboard panels can be stacked and processed immediately. UV curing lamps, placed between stations in multi-color offset printing, cure one color before next color is applied, eliminating color bleed, scratches, scuffs, etc. Controlled temperature can be obtained where UV curing is used on heat sensitive substrates.

Rate or speed of UV curing is affected by the following:

- UV curable compounds vary in composition. The type and amount of sensitizer, type and amount of pigment, etc. used in UV curable formulations will dictate UV curing speed.
- UV curing time is not directly proportional to coating thickness. A two-fold thickness requires 10 times the radiation energy of a single thickness. UV energy received inside a layer of coating decreases exponentially with depth.
- UV curing time will rise with the increase of UV energy per unit surface, up to the saturation point. This is not linear. The curing rate of most monomers, in the presence of air, at a rate greater than the increase in UV energy per unit surface. If the amount of UV energy per unit surface is doubled, curing speed may be tripled, quadrupled, or even rise ten-fold.

  Two lamps of even power will not cause a cure as quickly as one UV lamp with twice the radiation power. One lamp with twice the power doubles the energy radiated to the same surface and curing speed will double. UV curing lamps with the highest power-to-size ratio should be sued. The non-linear relation between curing rate and UV energy dictates the UV processor reflector design. Focused reflectors, incorporated in UVP, Inc. processors, concentrate the UV energy on a small surface, rather than a uniform distribution over a larger surface.
- Various UV sensitizers require different ranges of UV wavelength for proper reaction. Sensitizers should react to UV in a range other than those absorbed by the monomer or pigment. UVP, Inc. medium pressure Mercury lamps emit UV (180nm to 420nm), suitable for all UV curing applications.

BENCHTOP CURING SYSTEM SPECIFICATIONS

UVP processors consist of the following:

1. High Intensity UV Source (Lamp)
2. Irradiators (Lamp Housing and Reflector Assembly)
3. Shielding, Cooling, and Safety Equipment
4. Power Supply and Electrical Controls

Technical Data

- Length: 30”, width: 24”, height: 18”, weight 100 lbs.
- Central located exhaust fan
- Optical shielding
- 1-100 FPM variable speed control with FPM indicator
- Elasped-time indicator
- Elliptical focused heat sink reflector
- 6”, 300W/inch curing lamp
- Nomex-coated fiberglass belt
- Vacuum hold-down
- Tri-power lamp switching (300, 200, 125W/inch)
- 8’, 14/3 grounded electric cord

Part Numbers

Model	Part Number	Watts	Volts
BC-300	95-0194-01	300	120V/60Hz
BC-300	95-0194-02	300	220V/50Hz (CE Certified)
BC-300	95-0194-03	400	220V/50Hz (CE Certified)

GENERAL INSTRUCTIONS

1. After unpacking, check all electrical connections and mounting hardware to insure there is no damage.

2. If all items appear satisfactory, install ultraviolet lamp (see Lamp Installation Instructions sheets page 4).

3. to install the drop off plate on each of the curing system, refer to the “Installation of Drop Off Plate” under Diagrams (see sheet 1979-13).

3. A) Main power and lamp on switch to OFF position. B) High/low lamp intensity (1/2) switch to high position. C) 300 WPI systems - switch to 300 WPI setting. D) Variable speed control knob to ZERO.

4. Plug input cord into Grounded, 120 Volt 60 Hertz, 10 Amps A.C. Outlet. Do not remove ground contact from power cord under any circumstances.

5. Switch Main Power switch to on position. This switch sends power to the lamp switch variable speed control and activates center lamp cooling fan.

CAUTION: When fixture is operating, ultraviolet rays are emitted which are harmful to eyes and skin. Great care should be taken to insure personnel are not exposed to direct or reflected radiation. Suitable eye protection, such as UVP UV Blocking Spectacles or Goggles should be employed when lamp is in operation.

6. When shielding is in place and/or operators are utilizing ultraviolet absorbing safety glasses, the lamp switch may be turned on. This will light the ultraviolet lamp. The lamp requires a 3-4 minute warm-up prior to curing applications.

7. Start conveyor belt moving. Belt should always be moving when lamp is on.

8. High/Low lamp intensity option may be utilized to operate lamp at idle mode when curing application are on hold. Lamp will operate at approximately 1/2 the rated output and rapidly return to full power. On tri-power models switch lamp to 125 WPI when curing applications are on hold.

9. Shut-Down Procedure:

   A. High/Low lamp intensity switch to high position.
   B. Tri-Power models intensity switch to 300 WPI.
   C. Lamp switch to off position.
   D. Reduce belt speed.
   E. Allow main switch to operate cooling fan for 3-5 minutes before total shutdown. This will allow lamp to cool evenly and will prolong lamp life.
   F. Main power switch to off position.

Lamp Installation and Relamp Instructions

A drawing illustrating the lamp installation is included under the Diagrams section (see sheet 1874 1 of 4).

1. Turn power OFF.
2. Disconnect Hi-Voltage cable from irradiator cover. Refer to Wiring Diagram drawing number 1871.
3. Remove lamp irradiator cover by removing the 2 screws at each and of irradiator.
4. Place irradiator on its handles.
5. Remove top lampholder bracket from each side of lamp.
6. Side opposite the connector, remove aluminum cover and ceramic washer.
7. Slide lamp out.
8. When installing lamp, slide lamp between ceramic washer and aluminum holder. Use gloves to prevent fingerprints on lamp.
9. Replace aluminum holder and ceramic washer to assembly.
10. Center lamp so lamp ends are equally spaced on large lampholder bracket.
11. Replace top lampholder brackets, tightening each side equally. Clean lamp a with dry cloth and alcohol.
12. Replace assembly into side extrusion and secure with the 4 screws.
13. Re-connect Hi-Voltage connector.
14. Return to Step 3 of General Instructions.

CAUTION: When fixture is operating, ultraviolet rays are emitted which are harmful to eyes and skin. Great care should be taken to insure personnel are not exposed to direct or reflected radiation. Suitable eye and skin protection, such as UVP's UV Blocking Spectacles or Goggles should be employed when lamp is in operation. BEFORE CLEANING OR RELAMPING, TURN POWER OFF.

Non-Focused Lamp Installation Instructions

A drawing illustrating the lamp installation is included under the Diagrams section (see sheet 1874 3 of 4).

1. Turn power off.
2. Disconnect all power and high voltage cable to irradiator cover.
3. Remove lamp irradiator cover by removing the (2) 10-32 knobs at each end of the irradiator.
4. Place the irradiator upside down on its handles.
5. Refer to drawing 1874 sheet 3 of 4 (see Diagrams section).

6. Note: metal air diffuser used only with 4", 6" lamp assemblies and laboratory conveyorized system.

   A. Remove one metal air diffuser.

      Clean the UV lamp and reflectors with a lint free cloth and denatured isopropyl alcohol (we recommend the use of disposable latex or vinyl gloves to keep the lamp free of fingerprints which will burn into the lamp or liners and create hot spots, disallowing the transmission of the UV rays.)

   B. Place one wire & ceramic end of the lamp through the mounted metal air diffuser and on top of the lampholder. Place the loose metal air diffuser around the other lamp end and place the lamp end onto the lampholder.

   C. Remount metal air diffuser with 8-32 x 3/16" screws. Remove the non-focused bracket and the 8/32 x 1/2" screws from the package. At one end feed the wire ceramic end through the lager hole in the non-focus bracket. Mount non-focus bracket to the lampholder with the 8/32 x 1/2" screws provided. Mount the wire lead from the lamp end to the ceramic stand off and replace the 8-32 nut. Repeat on opposite end.

7. Place the irradiator back in place and tighten the (4) 10-32 knobs. Reconnect the high voltage cable by matching index insuring proper connection and screw connector cable down completely.

CAUTION: when fixture is operating, ultraviolet rays are emitted which are harmful to eyes and skin. Great care should be taken to insure personnel are not exposed to direct or reflected radiation. Suitable eye and skin protection, such as uvp's uv blocking spectacles or goggles should be worn when lamp is in operation. Before cleaning or relamping, ALWAYS TURN POWER OFF.

Focused Lamp Installation Instructions

1. Turn Power Off.

2. Disconnect all power and high voltage cable to irradiator cover.

3. Remove lamp irradiator cover by removing the (2) 10-32 knobs at each end of the irradiator.

4. Place the irradiator upside down on its handles.

5. Refer to drawing 1874 sheet 1 of 4 (see Diagrams section).

6. NOTE: mertal air diffuser use only with 4", 6" lamp assemblies and laboratory conveyorized system.

   A. Remove one metal diffuser. Loosen the 8-32 screws on the lampholder to release the top bracket. Do not remove the bracket--this will swing away.

      Clean the UV lamp and reflectors with a lint free cloth and denatured isopropyl alcohol (we recommend the use of disposable latex or vinyl gloves to keep th elamp free of ingerprints which will burn into the lamp or liners and create hotspots, disallowing the transmission of the UV rays).

   B. Place one wire and ceramic end of the lamp through the mounted metal air diffuser and on top of the lampholder. Place the loose metal air diffuser around the other lamp end and place the lamp end onto the lampholder.

C. Remount the metal air diffuser with 8-32x3/16" screws. Place the top bracket over the lamp end and tighten both screws. Mount the wire lead from the lamp end to the ceramic standoff and replace the 8-32 nut. Repeat on the oppositve side of the lamp.

7. Place the irradiator back in place and tighten the (4) 10-32 knobs. Reconnect the high voltage cable by matching index to index insuring proper connection and screw connector cable down completely.

CAUTION: When the fixture is opeating, ultraviolet rays are emitted which are harmful to eyes and skin. Great care should be taken to insure personnel are not exposed to direct or reflected radiation. Suitable eye and skin protection, such as UVP UV Blocking Spectacles and Goggles should be worn when the lamp is in operation. Before cleaning or relamping, ALWAYS TURN POWER OFF.

REPLACEMENT PARTS AND TECHNICAL SUPPORT

Contact UVP for a list of replacement parts for the BC-300 Benchtop Curing System. UVP offers technical support for all of its products. If you have any questions about the product's use, operation or repair, contact our offices below.

NOTE: A Returned Goods Authorization (RGA) number must be obtained from UVP Customer Service before returning a product to UVP.

UVP, Inc.
2066 W. 11th Street
Upland, CA 91786
Tel: (800) 452-6788 or
(909) 946-3197
Fax: (909) 946-3597
E-Mail: uvp@uvp.com

Ultra-Violet Products Ltd.
Unit 1, Trinity Hall Farm Estate
Nuffield Road
Cambridge CB4 1TG UK
Tel: +44(0) 1223-420022
Fax: +44(0) 1223-420561
E-Mail: uvpuk@uvp.com

TROUBLE SHOOTING AND PRODUCT DIAGRAMS

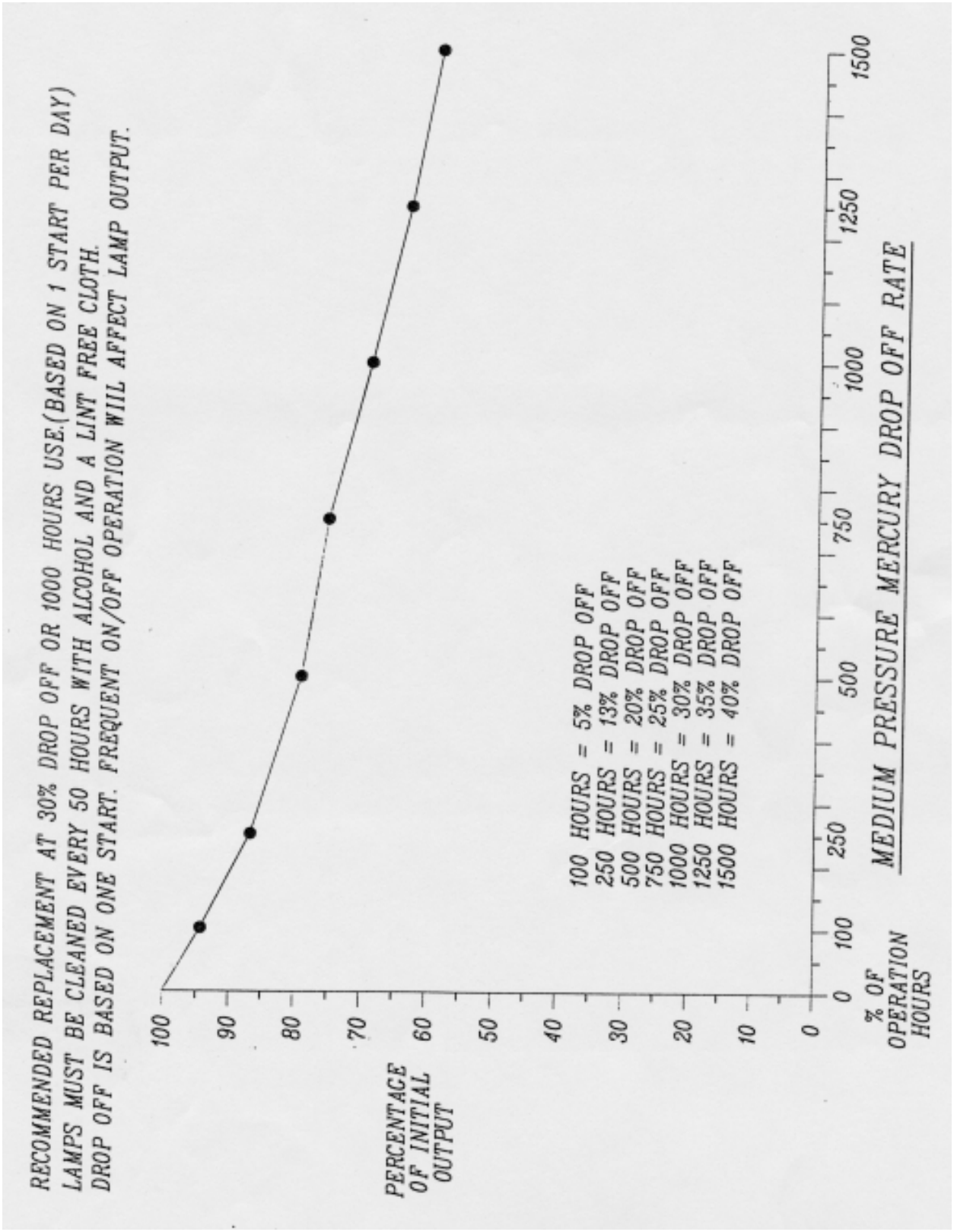
A troubleshooting check list for 208/220/420/440 volt 50/60 hertz conveyorized curing system models is shown on page 7.

NOTE: Because of the high voltage used throughout the power supply, only qualified personnel should work on it.

Wiring Diagrams, Lamp Installation Instruction Sheets, and Installation of Drop Off Plate are provided on the following pages.

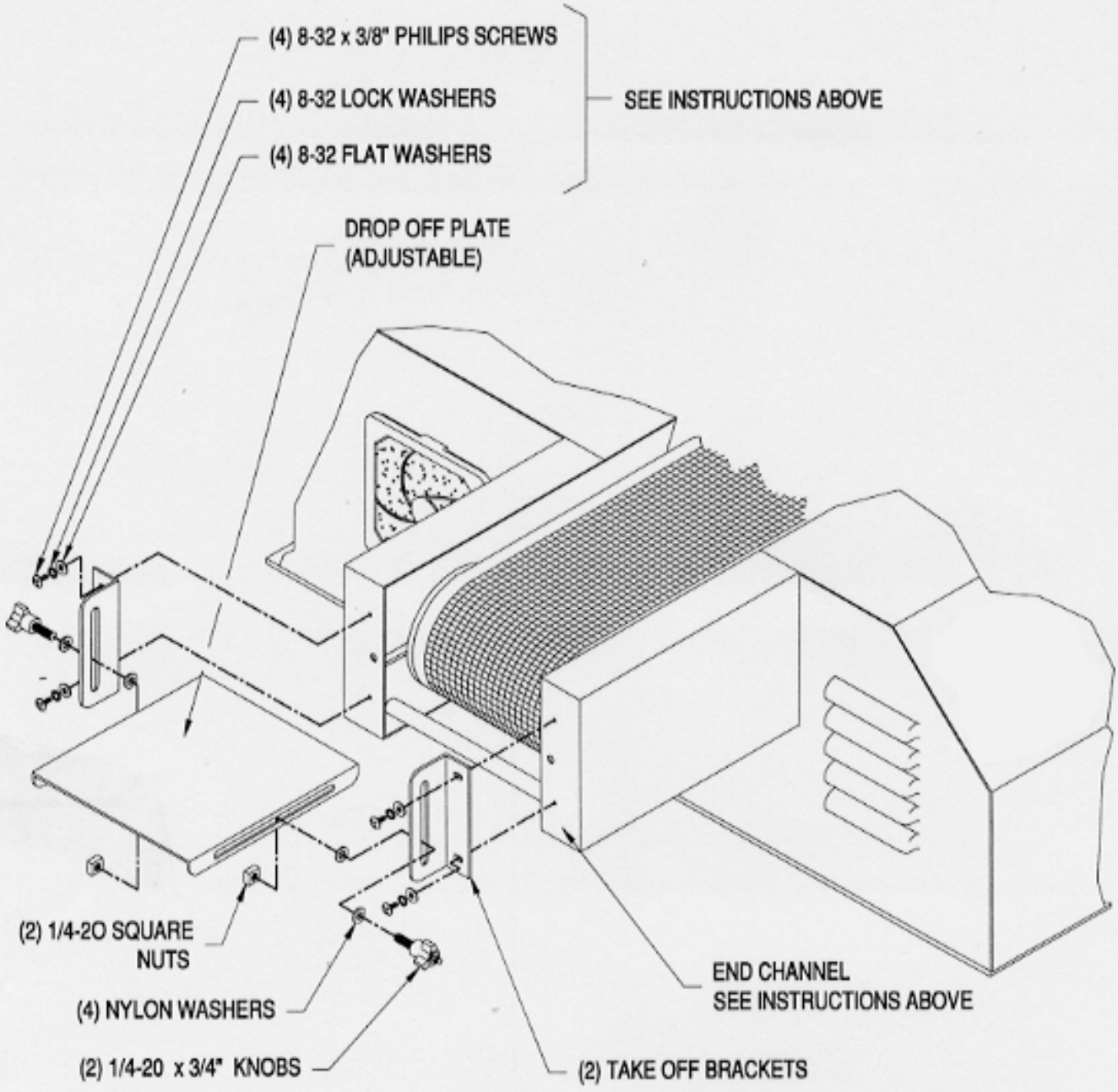
TROUBLESHOOTING CHECK LIST

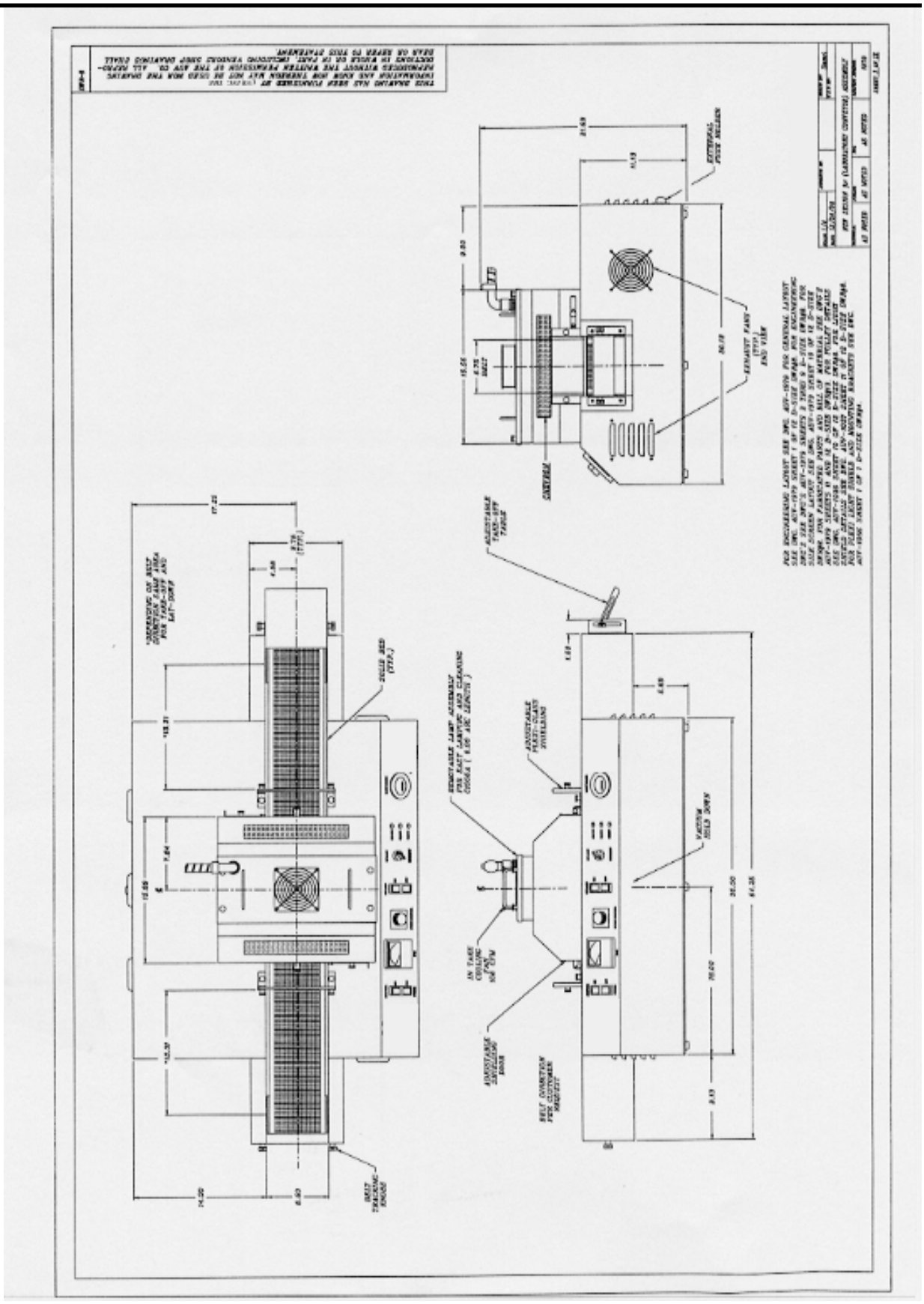
PROBLEM	CHECK	SOLUTION
House power on but no belt movement or panel lights	F1 in control box 5 Amp fuse	Replace fuse
Control box and belt working but no control power to power supply	F1 in rear of power supply 5 Amp fuse	Replace fuse
Lamp does not light	Lamp condition Main fuses Primary voltage	Replace fuses or lamp
	Check all primary and secondary wiring for burnt or loose connections	Repair or replace wires or connectors
	Check all capacitors	Replace if bad
	Check high voltage cable in rear of power supply and in irradiator for loose connections Check for proper seating between the male and female on top of the irradiator	Replace if needed
Conveyor motor will not start	Check DC output from SCR in control box terminal block A+, A-. If no DC output, check all AC input to SCR.	If AC input with no DC output, replace SCR
	Check at motor for DC power. If you have power remove motor from chain and try with no load. If it does not run, replace.	Replace motor
	If it does move, check chain and drive for loose or broken parts	Repair as needed
Vacuum blower will not run	Check fuses F2, F3 in control box	Replace if blown
	With blower switch on, check for power at blower receptacle	Replace switch or receptacle as needed
	If blower receptacle has power, check blower cord and connections. If OK, replace motor.	Replace motor if needed
Lamp comes on but secondary ammeter does not drop to proper reading after 5 minutes	Check lamp condition and hours	Replace lamp
Lamp will not come up to full power and start up	Check for bad capacitor. Check for mercury relay stuck in open position	Replace if needed
Lamp intensity will not change using rotary switch	With power off, check mercury relays. They are normally closed.	Replace relays if needed


RECOMMENDED REPLACEMENT AT 30% DROP OFF OR 1000 HOURS USE.(BASED ON 1 START PER DAY)
LAMPS MUST BE CLEANED EVERY 50 HOURS WITH ALCOHOL AND A LINT FREE CLOTH.
DROP OFF IS BASED ON ONE START. FREQUENT ON/OFF OPERATION WIIL AFFECT LAMP OUTPUT.
PERCENTAGE OF INITIAL OUTPUT
100
90
80
70
60
50
40
30
20
10
0
100 HOURS = 5% DROP OFF
250 HOURS = 13% DROP OFF
500 HOURS = 20% DROP OFF
750 HOURS = 25% DROP OFF
1000 HOURS = 30% DROP OFF
1250 HOURS = 35% DROP OFF
1500 HOURS = 40% DROP OFF
0
100
250
500
750
1000
1250
1500
% OF OPERATION HOURS
MEDIUM PRESSURE MERCURY DROP OFF RATE

INSTALLATION OF DROP OFF PLATE

DROP OFF PLATE TO BE INSTALLED OPPOSITE END (EXIT END) OF BELT TRACKING KNOBS.
THE (4) FOUR PHILIPS SCREWS w/ LOCK WASHERS AND FLAT WASHERS ARE TO BE REMOVED
FROM THE END OF THE CHANNEL AND REINSTALLED THRU THE TAKE-OFF BRACKET.





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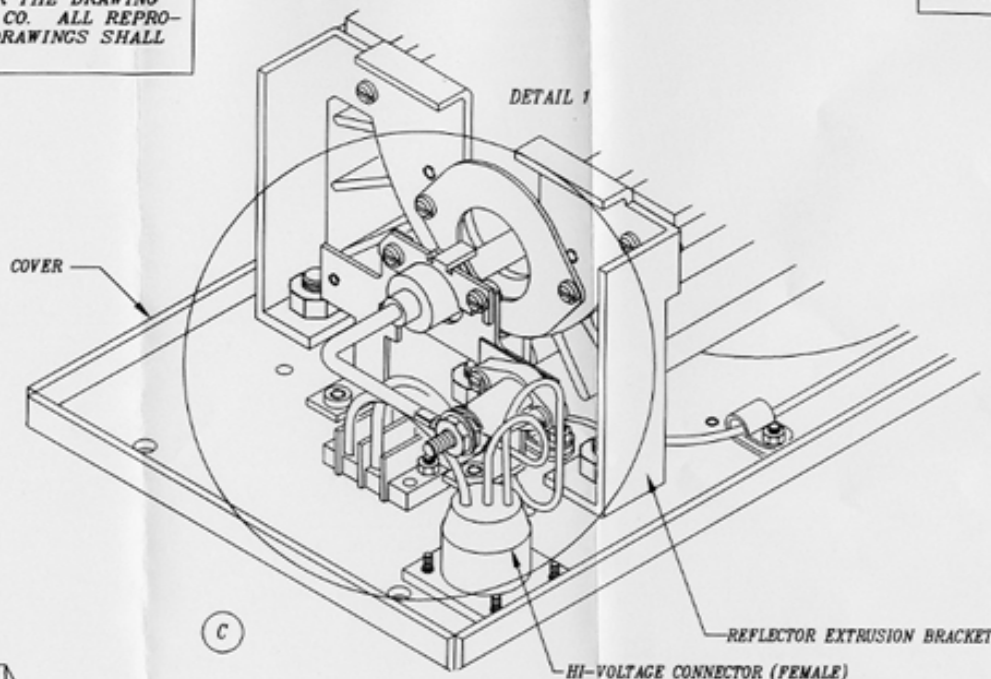
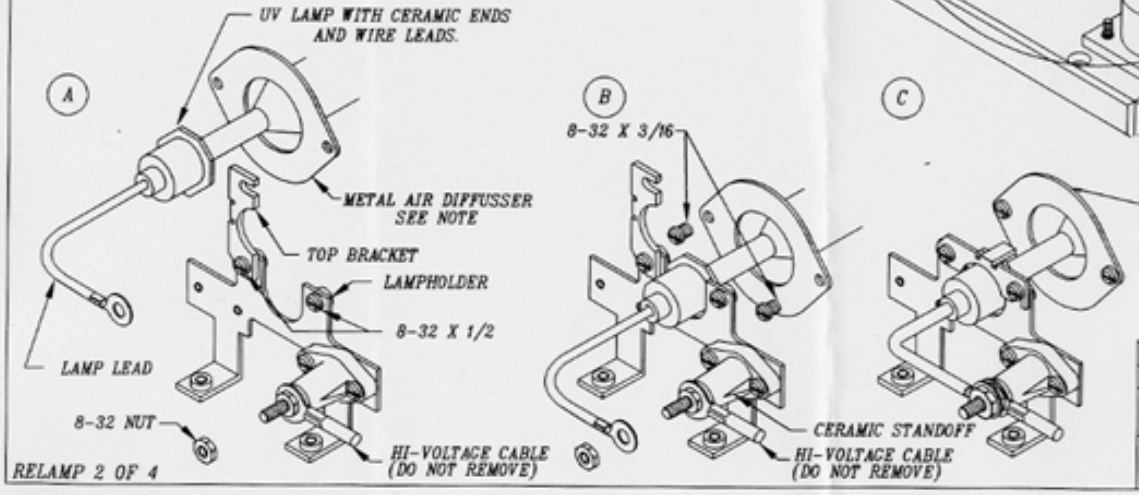
DWR- 13

TOOLS REQUIRED

1 NO2 STRAIGHT HEAD SCREW DRIVER. (MEDIUM SIZE)
1 NO2 PHILIPS HEAD SCREW DRIVER. (MEDIUM SMALL)
1 5/16 WRENCH.
1 11/32 SOCKET DRIVER.
1 LINT FREE CLOTH.
1 BOTTLE OF DENATURED OR ISOPROPL ALCOHOL.
1 PAIR OF LATEX OR VINYL GLOVES.



NOTE: HI-VOLTAGE CABLE (MALE) NOT SHOWN.
SEE RELAMP INSTRUCTION. RELAMP 2 OF 4.



NOTE:
AIR DIFFUSSER USED ONLY WITH 4", 6" LAMP ASSEMBLIES & LABORATORY CONVEYORIZED SYSTEM

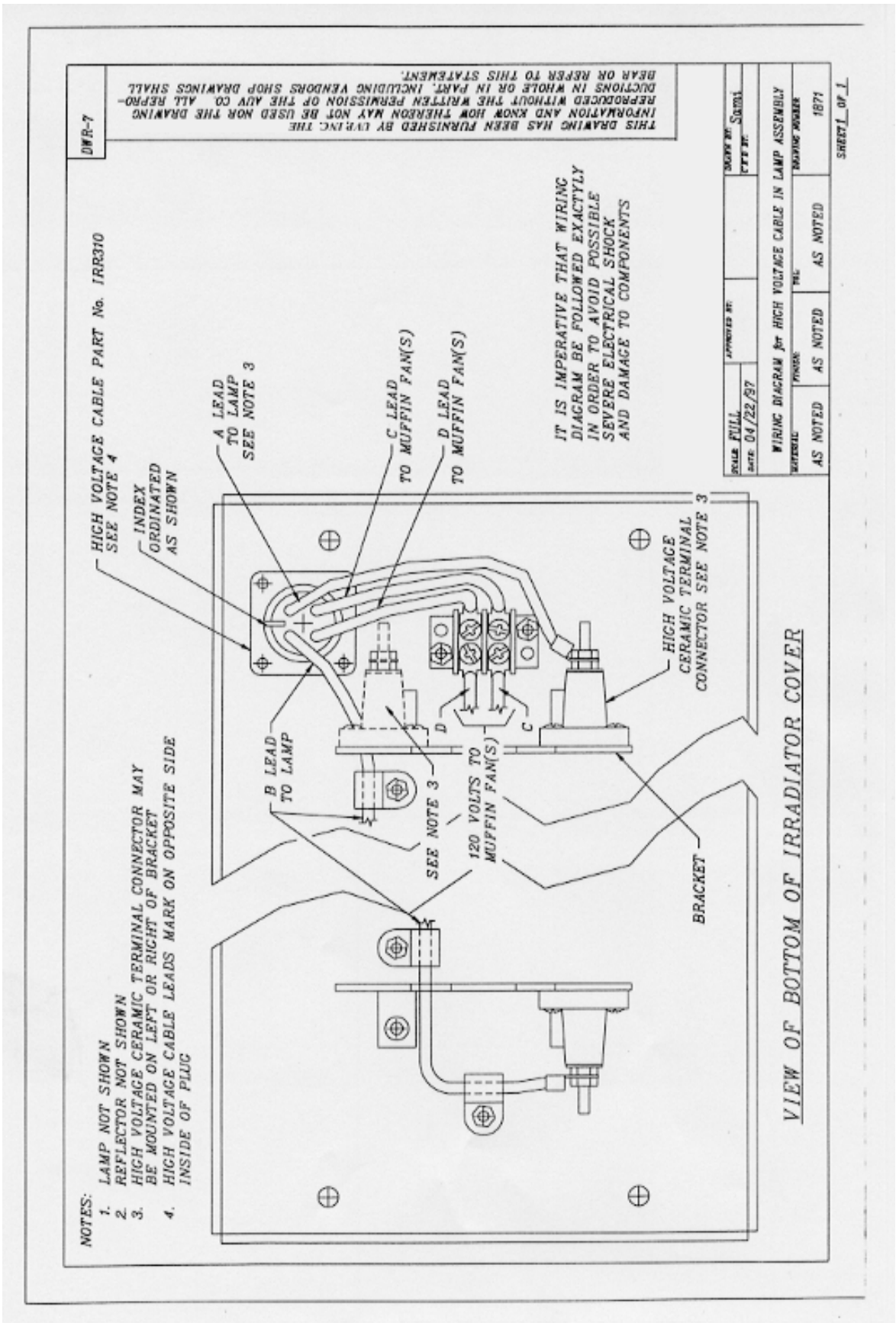
RELAMP 2 OF 4

SCALE: HALF	APPROVED BY: Sam 5/14/97		DRAWN BY: J.BUTLER
DATE: 05/13/97			C.K.D. BY: Sami

ILLUSTRATION OF LAMP INSTALLATION FOR FOCUS SYSTEM

MATERIAL	FINISH	TOL.	DRAWING NUMBER
			1874

SHEET 1 OF 4


VIEW OF BOTTOM OF IRRADIATOR COVER
HIGH VOLTAGE CABLE PART No. IRR310
SEE NOTE 4
INDEX ORDINATED AS SHOWN
A LEAD TO LAMP SEE NOTE 3
C LEAD TO MUFFIN FAN(S)
D LEAD TO MUFFIN FAN(S)
IT IS IMPERATIVE THAT WIRING DIAGRAM BE FOLLOWED EXACTLY IN ORDER TO AVOID POSSIBLE SEVERE ELECTRICAL SHOCK AND DAMAGE TO COMPONENTS
HIGH VOLTAGE CERAMIC TERMINAL CONNECTOR SEE NOTE 3
B LEAD TO LAMP
SEE NOTE 3
120 VOLTS TO MUFFIN FAN(S)
BRACKET
D
C
NOTES:
1. LAMP NOT SHOWN
2. REFLECTOR NOT SHOWN
3. HIGH VOLTAGE CERAMIC TERMINAL CONNECTOR MAY BE MOUNTED ON LEFT OR RIGHT OF BRACKET
4. HIGH VOLTAGE CABLE LEADS MARK ON OPPOSITE SIDE INSIDE OF PLUG
WIRING DIAGRAM for HIGH VOLTAGE CABLE IN LAMP ASSEMBLY
AS NOTED
AS NOTED
AS NOTED
1871
SHEET 1 OF 1
DWR-7

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DWR- 13

TOOLS REQUIRED

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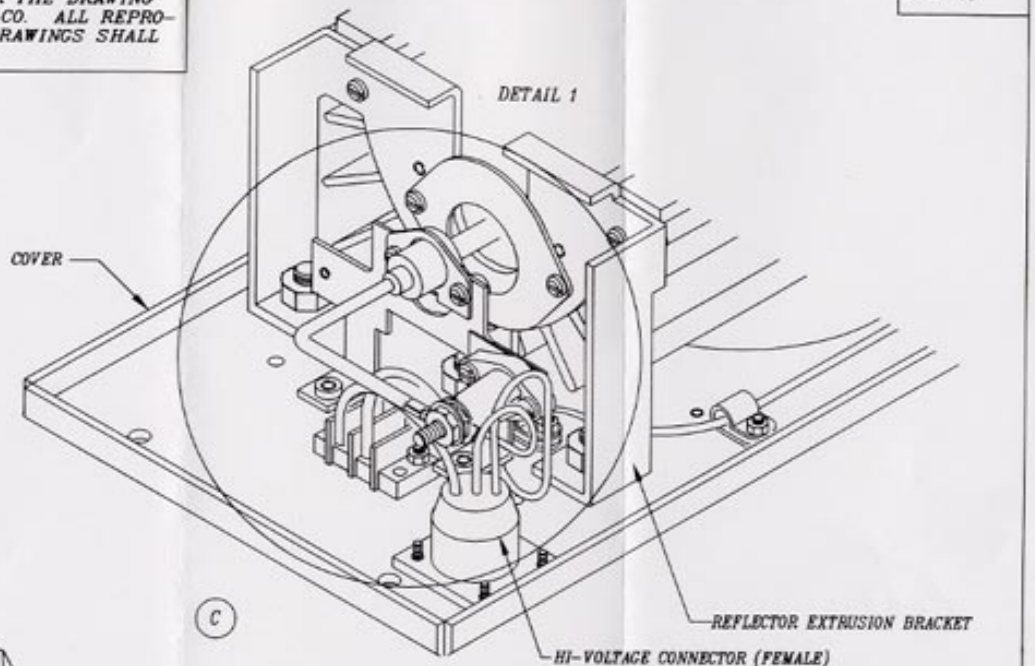
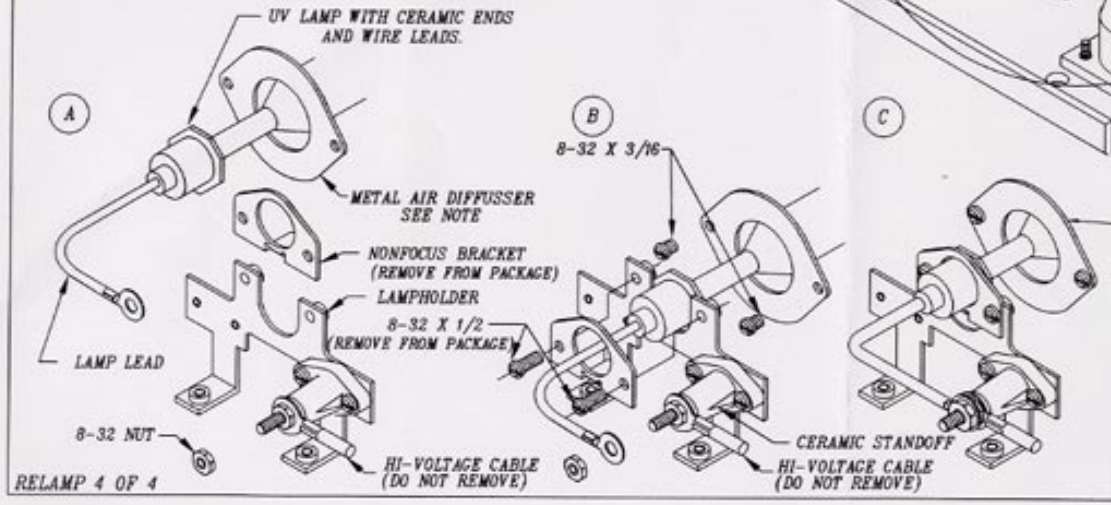
1 NO2 PHILIPS HEAD SCREW DRIVER. (MEDIUM SMALL)
1 5/16 WRENCH.
1 11/32 SOCKET DRIVER.
1 LINT FREE CLOTH.
1 BOTTLE OF DENATURED OR ISOPROPL ALCOHOL.
1 PAIR OF LATEX OR VINYL GLOVES.



NOTE: HI-VOLTAGE CABLE (MALE) NOT SHOWN. SEE RELAMP INSTRUCTION. RELAMP 4 OF 4.

NOTE:
AIR DIFFUSSER USED ONLY WITH 4", 6" LAMP ASSEMBLIES & LABORATORY CONVEYORIZED SYSTEM

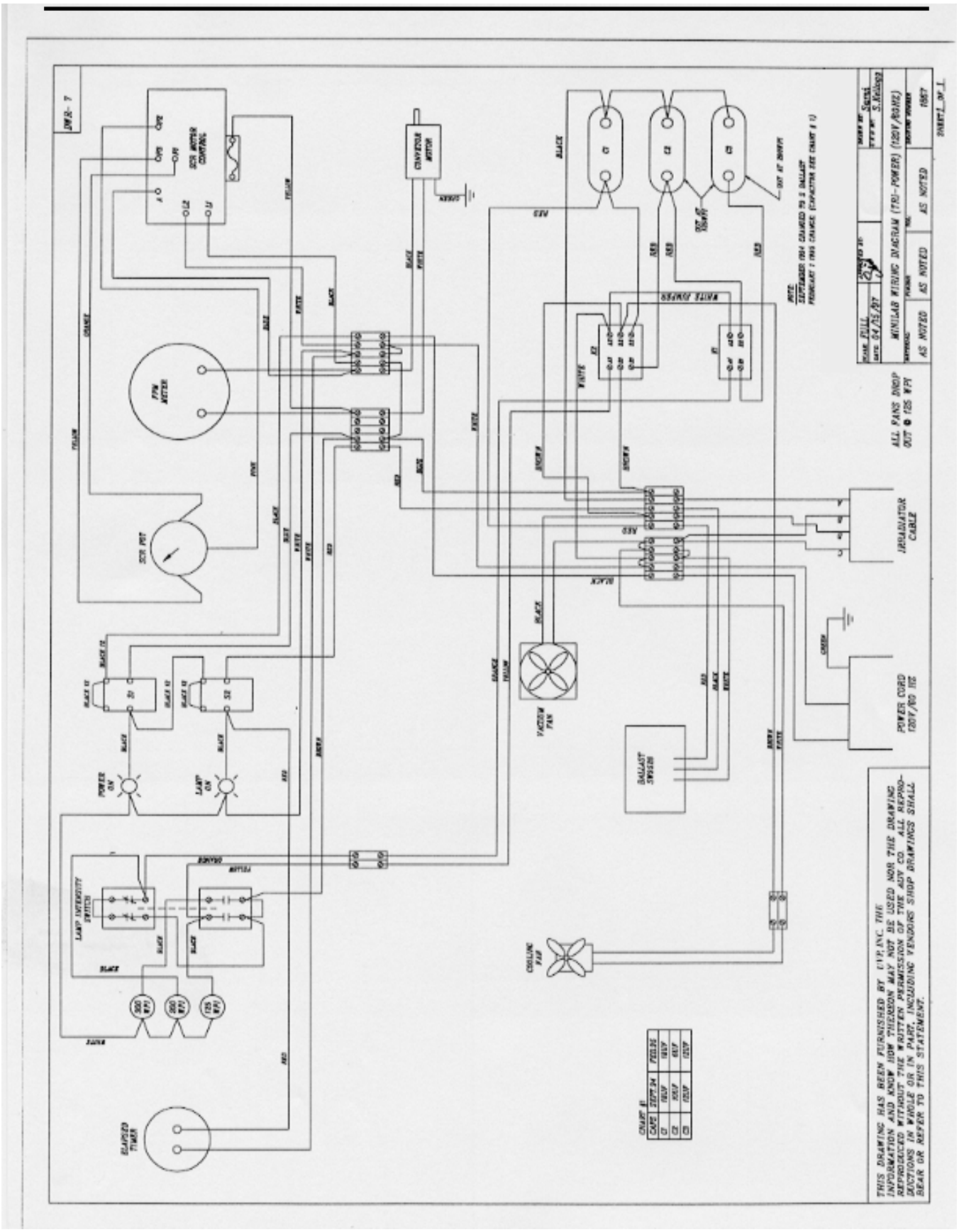


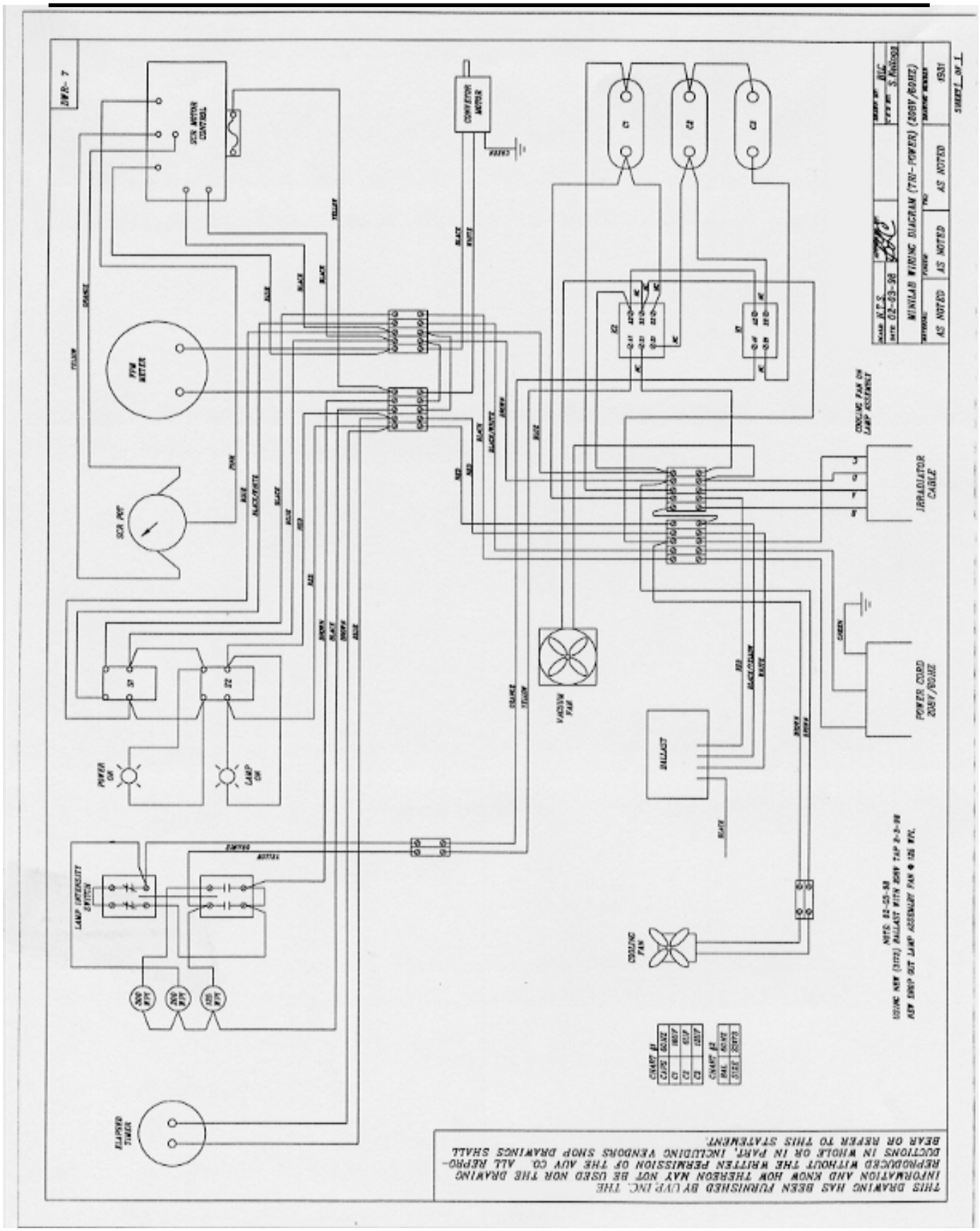
SCALE: HALF	APPROVED BY: 5/14/97		DRAWN BY: J.BUTLER
DATE: 05/13/97			C.K.D. BY: Sami

ILLUSTRATION OF LAMP INSTALLATION FOR NONFOCUS SYSTEM

MATERIAL	FINISH	TOL	DRAWING NUMBER
			1874

SHEET 3 OF 4




MINILAB WIRING DIAGRAM (THI-POWER) (208V/60HZ)
IRRADIATOR CABLE
POWER CORD 208V/60HZ
BALLAST
COOLING FAN
PWM METER
SCR POT
POWER ON
LAMP ON
ELAPSED TIMER
LAMP INTENSITY SWITCH
CONVECTION MOTOR
SCR MOTION CONTROL
C1
C2
C3
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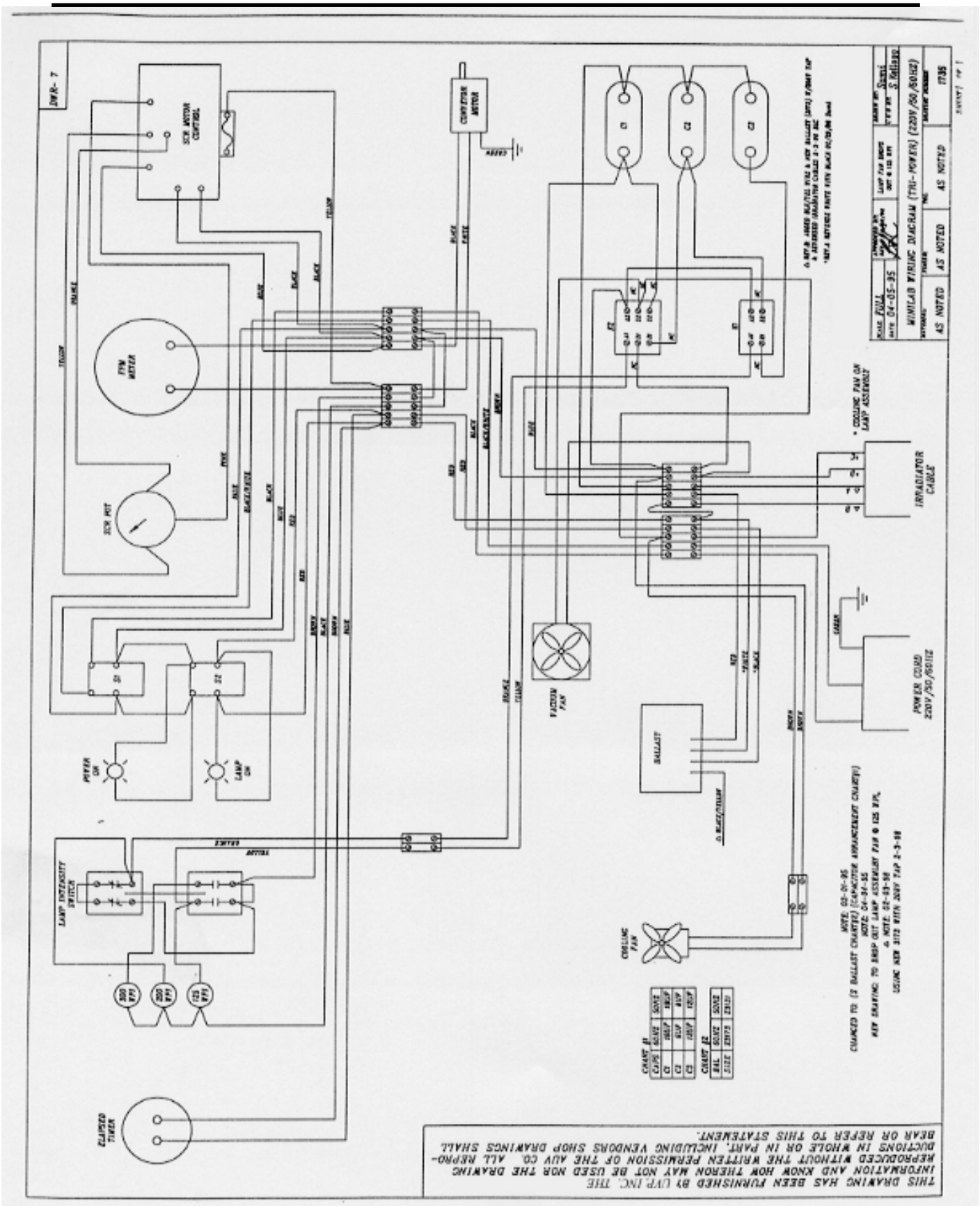

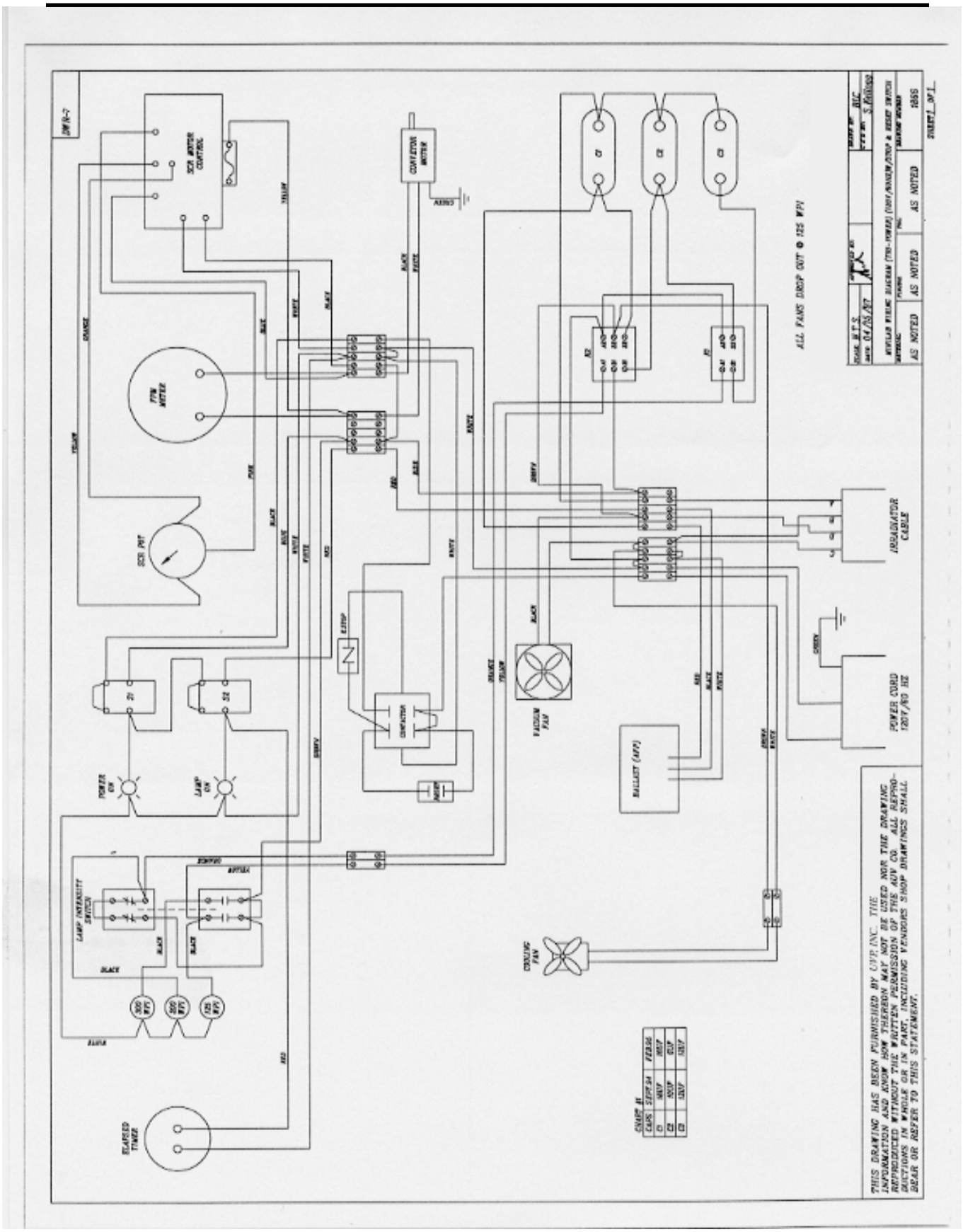
ALL FANS DROP OUT @ 125 VAC
IRRADIATOR CABLE
POWER CORD 120V/60 HZ
BALLAST (MV)
CONVEYOR MOTOR
SCR MOTOR CONTROL
SCR POT
FAN MOTOR
TIMER
AS NOTED
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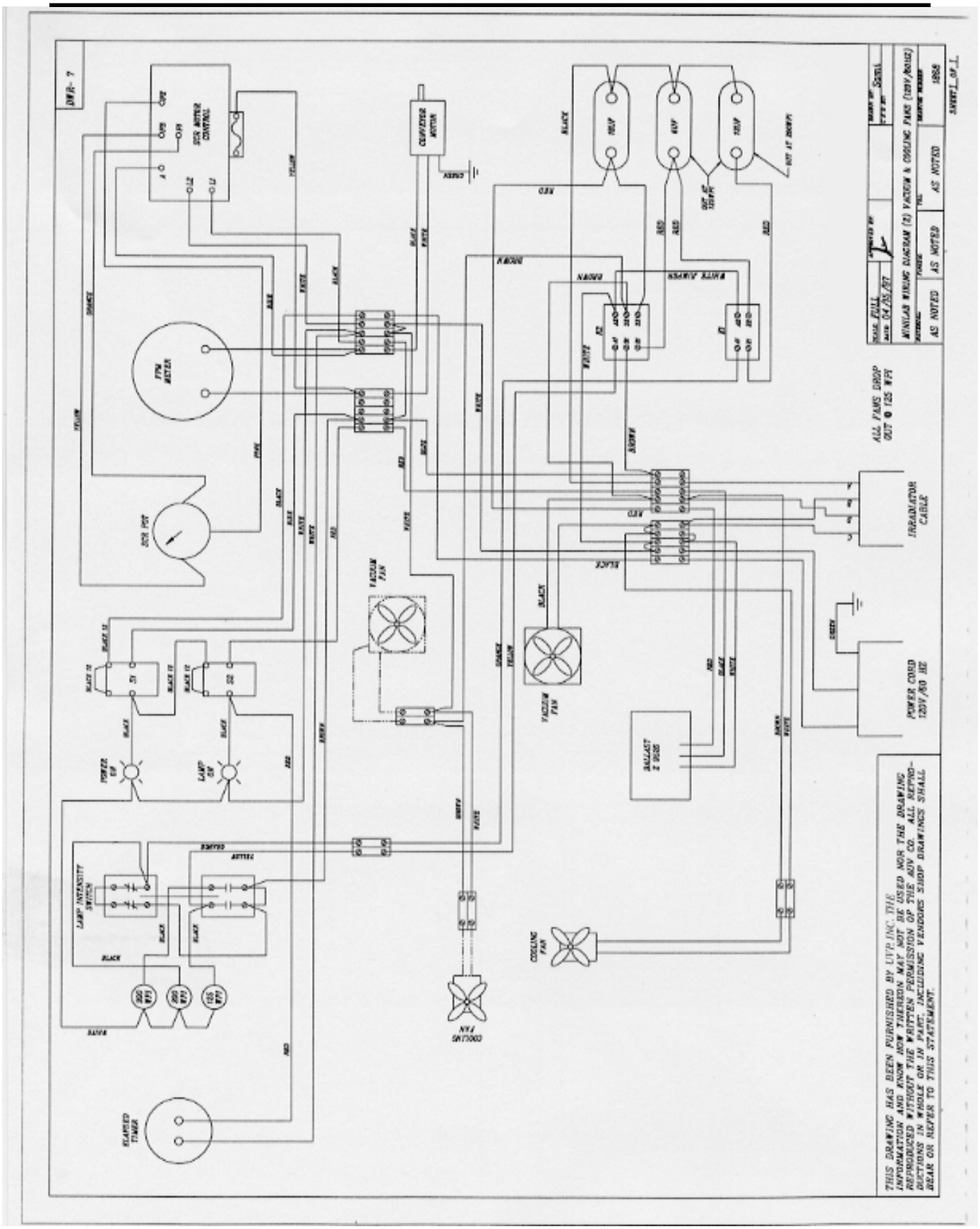

LIMITED WARRANTY

UVP's quality products are guaranteed to be free of defects in material and workmanship for one (1) year from date of shipment under the conditions of normal usage and service. However, double shift operations limit the warranty to six months and twenty-four (24) hour operations limit the warranty to 90 days. If product failure or malfunction occurs during the warranty period, UVP shall examine the inoperative product and have the option to repair or replace any components, which, in the judgment of UVP, were originally defective or become so under conditions of normal usage and service. Customers must first obtain Returned Goods Authorization number (RGA#) from UVP prior to making any returns. The components or product must shipped freight prepaid insured, to UVP Inc., 2066 W. 11th Street, Upland, CA 91786.

No warranty shall apply to any products, or component of it, which has been subject to accident, negligence, altercation, abuse or misuse by the end-user. No warranty is offered on components or service supplied by a source other than UVP except for those in strict compliance with the instructions outlined in the end-user's operational manual. Ultraviolet Curing lamps are warranted on a prorated basis based on 1,000 hours of usage. When lamps are used at 300 WPI constantly, warranty is for 750 hours.

Consequential damages, lost time, inconveniences or contingent liabilities are not covered by this warranty. Repair time is based open the availability of labor, and all parts and components required to make the repair, UVP is not responsible or liable for any personal injuries occurring because of the use, installation and/or servicing of products.

All labor, travel costs and sustenance, for service technicians, is the purchaser's responsibility. Expendable components such as conveyor belts, UV Lamps, or fuses are not covered by this warranty.

CAUTION

ULTRAVIOLET LAMPS EMIT RADIATION THAT IS HARMFUL TO EYES AND SKIN. GREAT CARE SHOULD BE TAKEN TO INSURE THAT PERSONNEL ARE NOT EXPOSED TO DIRECT OR REFLECTED RADIATION. SUITABLE EYE PROTECTION, SUCH AS UVP, INC. UV BLOCKING SPECTACLES OR GOGGLES, SHOULD BE WORN WHEN LAMP IS IN OPERATION. BEFORE CLEANING OR RELAMPING, ALWAYS TURN POWER OFF.

Other quality products from UVP:
UV Intensity Meters, UV Blocking Eyewear, Handheld Ultraviolet Lamps,
High Intensity Ultraviolet Lamps, Display and Bench UV Lamps,
UV Transilluminators, UV Crosslinkers

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